

1     CLAIMS

2

- 3     1.   Apparatus for the treatment of hazardous  
4         material and decontamination of items  
5         contaminated with such material comprising an  
6         operator accessible treatment vessel adapted to  
7         hold said hazardous material or contaminated  
8         items and a light source capable of irradiating  
9         contents within the treatment vessel with a  
10        predetermined wavelength of light.
- 11
- 12    2.   Apparatus according to Claim 1 wherein the  
13         treatment vessel comprises one or more trays  
14         for holding the hazardous material or  
15         contaminated items, further comprising  
16         distribution means for circulating a carrier  
17         medium within or through the apparatus.
- 18
- 19    3.   Apparatus according to either one of Claims 1  
20         and 2 further comprising monitoring means.
- 21
- 22    4.   Apparatus according to Claim 1 further  
23         comprising a holding tank capable of holding a  
24         carrier medium, a catalyst hopper capable of  
25         holding a catalyst, a mixing vessel  
26         facilitating mixing of the carrier medium and  
27         the catalyst, wherein the treatment vessel  
28         comprises one or more treatment chambers each  
29         having a housing containing a plurality of  
30         treatment beds and a light source, and a  
31         distribution header for controlling the flow of

1 carrier medium and catalyst into the treatment  
2 chambers.

3

4 5. Apparatus according to Claim 4 wherein each  
5 treatment bed comprises means for inducing  
6 turbulent flow within the carrier medium.

7

8 6. A method for treatment for hazardous material  
9 or decontamination of items contaminated with  
10 such material comprising the step of  
11 irradiating said material or said items in the  
12 presence of a catalyst with light having a  
13 wavelength in the range of from 310 to 400  
14 nanometres.

15

16 7. A method according to Claim 6 wherein the  
17 catalyst is  $\text{TiO}_2$ .

18

19 8. A method according to Claim 7 wherein the  
20 catalyst is  $\text{TiO}_2$  in either rutile or anatase  
21 form.

22

23 9. A method according to any of Claims 6 to 8  
24 wherein the irradiation step is carried out at  
25 a temperature of between about 15°C to 35°C and  
26 a pressure of between about 1 bar to 5 bar.

27

28 10. A method according to any one of Claims 6 to 9  
29 wherein the irradiation step is carried out in  
30 an aqueous based carrier medium.